AIR QUALITY TECHNICAL ADDENDUM

STATE ROUTE 55 (SR-55) IMPROVEMENT PROJECT BETWEEN INTERSTATE 405 (I-405) AND INTERSTATE 5 (I-5)

ORANGE COUNTY, CALIFORNIA

$PM_{2.5}$ AND PM_{10} ANALYSIS

12-ORA-55 PM 6.4/10.3

EA: 0J3400

Submitted to:

State of California
Department of Transportation, District 12
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INTRODUCTION

LSA Associates, Inc. (LSA) prepared this $PM_{2.5}$[1] and PM_{10}[2] Hot-Spot Analysis Air Quality Technical Addendum for the State Route 55 (SR-55) Improvement Project according to the conformity regulations (40 Code of Federal Regulations (CFR) 93.116 and 123 as of January 10, 2012) and the United States Environmental Protection Agency (EPA) guidance for PM[3] hotspot analysis of 2006 and 2010.

This $PM_{2.5}$ and PM_{10} analysis addresses the construction of the SR-55 Improvement Project, including the following components identified in the Regional Transportation Plan (RTP) and the Federal Transportation Improvement Program (FTIP): Project ID: ORA100511, Description: SR-55 widening between I-405 and I-5. Add one lane in both directions.

PROJECT LOCATION AND DESCRIPTION

The California Department of Transportation District 12 (Caltrans), in cooperation with the Orange County Transportation Authority (OCTA), proposes to widen SR-55 in both directions from just north of the Interstate 405 (I-405)/SR-55 interchange to just south of the Interstate 5 (I-5)/SR-55 interchange between post mile 6.4 and post mile 10.3. The project area is located along SR-55 in the cities of Santa Ana, Tustin, and Irvine in Orange County, California (Figure 1). SR-55 is a major link to other freeway systems within Orange County and provides access between central Orange County and the coastal region. SR-55 is one of the most congested freeways in Orange County and currently operates at an unacceptable level of service (LOS) during peak time periods

Currently, SR-55 has four general-purpose lanes and one high-occupancy vehicle (HOV) lane in both the northbound and southbound directions along with auxiliary lanes between ramps in specific locations along the corridor. The demand in the future is anticipated to increase traffic volumes by approximately 13 percent by 2040, consequently increasing delays. The project evaluates four alternatives to increase freeway capacity and reduce congestion for the future. The project cost has been estimated at between $104.1 million and $208.2 million, depending on the alternative selected, and is proposed to be funded with renewed Measure M (M2) Transportation Investment Plan, Project F.

Alternative 1

Alternative 1 would add one general-purpose lane southbound between McFadden Avenue and Edinger Avenue. Alternative 1 would also add one auxiliary lane in the northbound direction between MacArthur Boulevard and Dyer Road and between Dyer Road and Edinger Avenue where no auxiliary lanes currently exist.

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1 Particulate matter less than 2.5 microns in diameter.
2 Particulate matter less than 10 microns in diameter.
3 Particulate matter

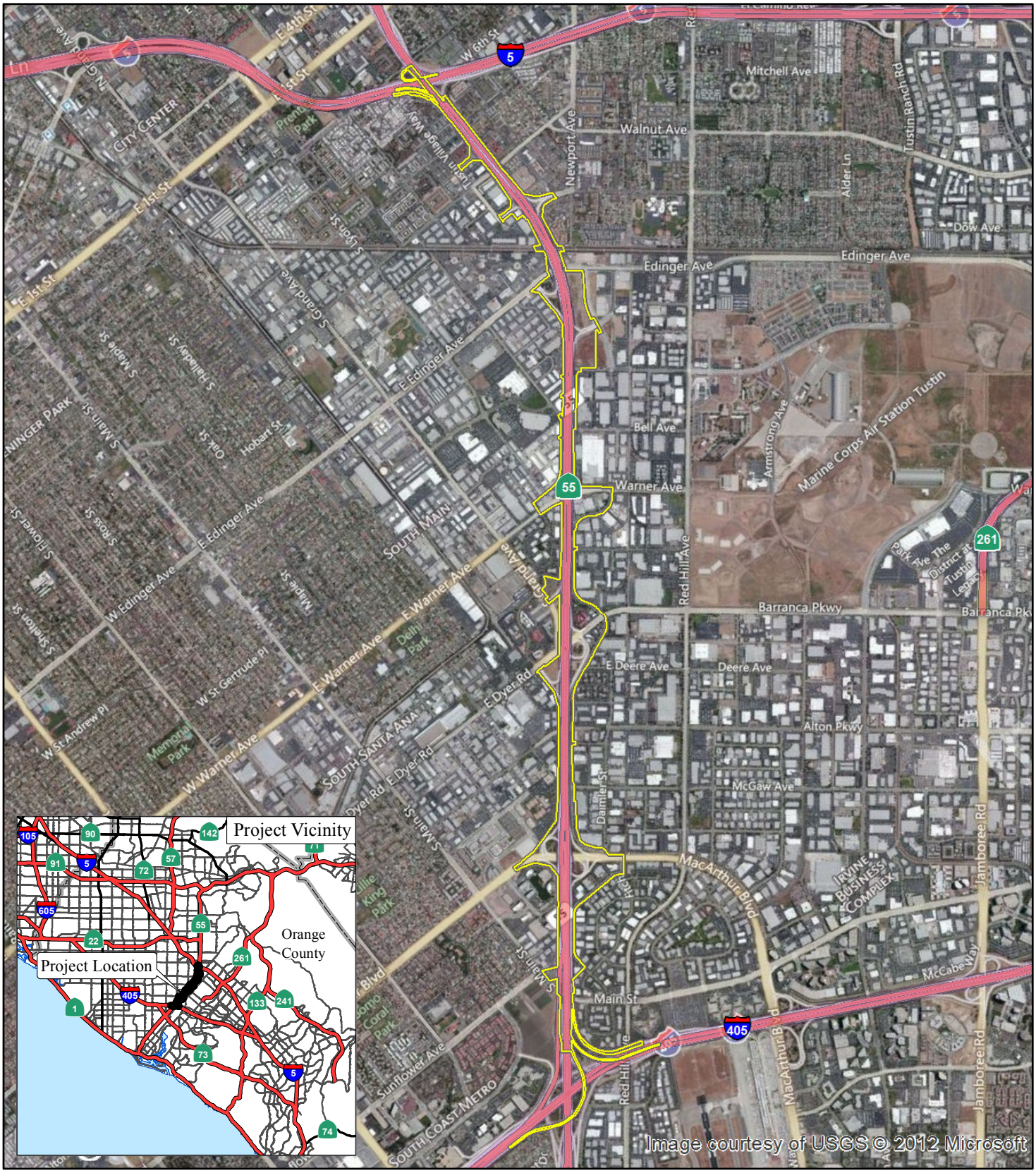

FIGURE 1

LEGEND

Project Limits

State Route 55 (SR-55) Improvement Project between Interstate 405 (I-405) and Interstate 5 (I-5)

Project Location

0 1500 3000

FEET

SOURCE: Bing Maps (c. 2008); TBM (2008); HDR (9/2012)

I:\HDR1102\GIS\ProjectLocation.mxd (10/19/2012)

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Alternative 2

Alternative 2 would add one general-purpose lane (in each direction) within the project limits. Alternative 2 would also convert the existing auxiliary lane into a general-purpose lane in the northbound direction between MacArthur Boulevard and Dyer Road and in the southbound direction between Edinger Avenue and Dyer Road and between Dyer Road and MacArthur Boulevard.

Alternative 3

Alternative 3 would add one general-purpose lane (in each direction) within the project limits. In addition, all existing auxiliary lanes would be maintained and additional auxiliary lanes would be added in the northbound direction between MacArthur Boulevard and Dyer Road and between Dyer Road and Edinger Avenue.

Alternative 4

Alternative 4 (Alternative 5 from the Project Study Report/Project Development Support [PSR-PDS]) would add one general-purpose lane southbound between McFadden Avenue and Edinger Avenue. Alternative 4 would also add one additional HOV lane in each direction within the project limits. All existing auxiliary lanes would be maintained and additional auxiliary lanes would be added in the northbound direction between MacArthur Boulevard and Dyer Road and between Dyer Road and Edinger Avenue.

No Build Alternative

The No Build Alternative assumes that no improvements are made to the SR-55. The No Build Alternative would maintain the existing conditions.

Purpose and Need

Purpose. The purpose of this project is to provide congestion relief, improve traffic flow, and increase mobility on SR-55 from south of I-5 to I-405. The objectives of this project are as follows:

1. Improve mobility and reduce congestion
2. Improve traffic operations
3. Increase capacity
4. Improve and incorporate up-to-date technological traffic control measures

Need. The project study area currently operates at unacceptable LOS during peak periods. The most significant key factors/issues are:

1. Limited general-purpose lane capacity on SR-55
2. Inadequate merging distances along the freeway due to the close proximity of on/off-ramps along the mainline
3. Nonstandard lane and shoulder widths at various locations

$PM_{2.5}$ AND PM_{10} HOT-SPOT METHODOLOGY

The new Final Rule establishes the transportation conformity criteria and procedures for determining which transportation projects must be analyzed for local air quality impacts in $PM_{2.5}$ and PM_{10} nonattainment and maintenance areas. The proposed project is in the South Coast Air Basin (Basin), which has been designated as a Federal nonattainment area for $PM_{2.5}$ and PM_{10}; therefore, a hot-spot analysis is required.

A hot-spot analysis is defined in 40 CFR 93.101 as an estimation of likely future localized pollutant concentrations and a comparison of those concentrations to the relevant air quality standards. A hot-spot analysis assesses the air quality impacts on a scale smaller than an entire nonattainment or maintenance area, such as for congested roadway intersections and highways or transit terminals. Such an analysis is a means of demonstrating that a transportation project meets Clean Air Act (CAA) conformity requirements to support State and local air quality goals with respect to potential localized air quality impacts. When a hot-spot analysis is required, it is included within the project-level conformity determination that is made by the Federal Highway Administration (FHWA) or the Federal Transit Administration (FTA).

Section 176(c)(1)(B) of the CAA is the statutory criterion that must be met by all projects in nonattainment and maintenance areas that are subject to transportation conformity.
Section 176(c)(1)(B) states that federally supported transportation projects must not "cause or contribute to any new violation of any standard in any area; increase the frequency or severity of any existing violation of any standard in any area; or delay timely attainment of any standard or any required interim emission reductions or other milestones in any area."

National Ambient Air Quality Standards

$PM_{2.5}$ nonattainment and maintenance areas are required to attain and maintain two national ambient air quality standards (NAAQS):

- **24-hour Standard:** 35 micrograms per cubic meter ($\mu g/m^3$).
- **Annual Standard:** 15.0 $\mu g/m^3$

The current 24-hour standard is based on a 3-year average of the 98th percentile of 24-hour $PM_{2.5}$ concentrations. The current annual standard is based on a 3-year average of annual mean $PM_{2.5}$ concentrations. A $PM_{2.5}$ hot-spot analysis must consider both standards unless it is determined for a given area in which meeting the controlling standard would ensure that CAA requirements are met for both standards. The interagency consultation process should be used to discuss how the qualitative $PM_{2.5}$ hot-spot analysis meets statutory and regulatory requirements for both $PM_{2.5}$ standards, depending on the factors that are evaluated for a given project.

PM_{10} nonattainment and maintenance areas are required to attain the following standard:

- **24-hour Standard:** 150 $\mu g/m^3$

The 24-hour PM_{10} standard is attained when the average number of exceedances in the previous 3 calendar years is less than or equal to 1.0. An exceedance occurs when a 24-hour concentration of 155 $\mu g/m^3$ or greater is measured at a site. The annual PM_{10} standard of 50 $\mu g/m^3$ is no longer used for determining the Federal attainment status. The interagency consultation process should be used to discuss how the qualitative PM_{10} hot-spot analysis meets statutory and regulatory requirements for the PM_{10} standards, depending on the factors that are evaluated for a given project.

To meet statutory requirements, the 2006 Final Rule requires $PM_{2.5}$ and PM_{10} hot-spot analyses to be conducted for Projects of Air Quality Concern (POAQC). The Final Rule states that projects not identified in 40 CFR 93.123(b)(1) as POAQC have met statutory requirements without any further hot-spot analyses (40 CFR 93.116[a]).

$PM_{2.5}$ AND PM_{10} HOT-SPOT ANALYSIS

Projects of Air Quality Concern

The first step in the hot-spot analysis is to determine whether a project meets the standard for a POAQC. The EPA specified in 40 CFR 93.123(b)(1) of the 2006 Final Rule that POAQC are certain highway and transit projects that involve significant levels of diesel vehicle traffic, or any other project that is identified in the $PM_{2.5}$ and PM_{10} State Implementation Plan (SIP) as a localized air quality concern. The 2006 Final Rule defines the POAQC that require a $PM_{2.5}$ and PM_{10} hot-spot analysis in 40 CFR 93.123(b)(1) as:

i. New or expanded highway projects that have a significant number of or significant increase in diesel vehicles;

ii. Projects affecting intersections that are at LOS (LOS) D, E, or F with a significant number of diesel vehicles, or those that will change to LOS D, E, or F because of increased traffic volumes from a significant number of diesel vehicles related to the project;

iii. New bus and rail terminals and transfer points that have a significant number of diesel vehicles congregating at a single location;

iv. Expanded bus and rail terminals and transfer points that significantly increase the number of diesel vehicles congregating at a single location; or

v. Projects in or affecting locations, areas, or categories of sites that are identified in the $PM_{2.5}$ and PM_{10} applicable implementation plan or implementation plan submission, as appropriate, as sites of violation or possible violation.

A PM Conformity Hot Spot Analysis for the SR-55 Improvement Project was presented to the Southern California Association of Governments' (SCAG) Transportation Conformity Working Group (TCWG) on June 26, 2012. The TCWG determined that the proposed project would meet Criteria (i) because it would expand an existing freeway with existing and future high truck volumes. As the proposed project meets one of the five criteria listed above, it is considered to be a POAQC, and a qualitative project-level $PM_{2.5}$ and PM_{10} hot-spot analysis has been conducted to assess whether the project would cause or contribute to any new localized $PM_{2.5}$ or PM_{10} violations, increase the frequency or severity of any existing violations, or delay timely attainment of the $PM_{2.5}$ and PM_{10} NAAQS.

Types of Emissions Considered

In accordance with the EPA/FHWA Guidance, this hot-spot analysis is based on directly emitted and reentrained $PM_{2.5}$ and PM_{10} emissions. Tailpipe, brake wear, tire wear, and road dust $PM_{2.5}$ and PM_{10} emissions were considered in this hot-spot analysis.

Vehicles cause dust from paved and unpaved roads to be reentrained, or resuspended, in the atmosphere. According to the 2006 Final Rule, road dust emissions are to be considered for PM_{10} hot-spot analyses. For $PM_{2.5}$, road dust emissions are only to be considered in hot-spot analyses if the EPA or the State air agency has made a finding that such emissions are a significant contributor to the $PM_{2.5}$ air quality problem (40 CFR 93.102(b)(3)). The South Coast Air Quality Management District's (SCAQMD) 2007 Air Quality Management Plan (AQMP) identified reentrained road dust as a significant source of $PM_{2.5}$ in the area's emission budget. In addition, the EPA has published guidance on the use of AP-42 for reentrained road dust for State Implementation Plan (SIP) development and conformity (January 2011); therefore, reentrained $PM_{2.5}$ is considered in this analysis.

Secondary particles formed through $PM_{2.5}$ and PM_{10} precursor emissions from a transportation project take several hours to form in the atmosphere, giving emissions time to disperse beyond the immediate project area of concern for localized analyses; therefore, they were not considered in this hot-spot analysis. Secondary emissions of $PM_{2.5}$ and PM_{10} are considered part of the regional emission analysis prepared for the conforming RTP and FTIP.

According to the project schedule, construction will begin in mid-2017 and be completed by mid-2020. Because construction will last 3 years, it does not meet the conformity rule's criterion of 5 years or longer for requiring inclusion of construction emissions in regional and project-level conformity analysis (40 CFR 93.123(c)(5)). Therefore, construction-related emissions may be considered temporary; and any construction-related $PM_{2.5}$ and PM_{10} emissions due to this project were not included in this hot-spot analysis. This project will comply with the SCAQMD Fugitive Dust Rules for fugitive dust during construction of this project. In addition, per Transportation Conformity Rule 93.117, the project will be required to comply with any $PM_{2.5}$ and PM_{10} control measures in the SIP. Excavation, transportation, placement, and handling of excavated soils will result in no visible dust migration. A water truck or tank will be available within the project limits at all times to suppress and control the migration of fugitive dust from earthwork operations.

Analysis Method

This analysis has been prepared according to the 2006 EPA Qualitative Hot Spot Guidance, which estimates the likely effect of a project on localized pollutant concentrations based on emission analysis. According to hot-spot methodology, estimates of future localized $PM_{2.5}$ and PM_{10} pollutant concentrations need to be determined. This analysis establishes that the local air quality is consistent with the 2007 AQMP by comparing the locally monitored $PM_{2.5}$ and PM_{10} concentrations to the AQMP's projections. Additionally, the impacts of the project on the regional $PM_{2.5}$ and PM_{10} emissions and the likelihood of these impacts interacting with the ambient $PM_{2.5}$ and PM_{10} levels to cause hot spots are discussed.

The California Air Resources Board's (ARB) EMFAC2007 Version 2.3 (EMFAC) was used to develop emission factors for the various criteria pollutants.[1] Ordinarily, the opening year (highest emission factors) and horizon year (highest traffic volume) are the most likely to have the highest emissions. Therefore, the EMFAC model was run for both the opening year 2020 and build-out year 2040. EMFAC has a variety of user options that allow the user to analyze on-road emissions under different conditions. For the SR-55 Improvement Project, the following options were used:

- Operation Parameters
  - Geographic area chosen: Orange County.
  - Calendar Year: 2020 and 2040 analysis year for the No Build Alternative and Alternatives 1, 2, 3, and 4.
  - Season: Annual average season was used, which represents an average of all monthly inventories.
- Modes
  - The model was run in the "EMFAC" mode to generate emission factors in grams of pollutant emitted per vehicle activity (grams per vehicle mile travelled [VMT] and grams/hour).

Reentrained Dust. EMFAC2007 does not estimate road dust emissions; therefore, the emission rates listed in Section 13.2.1 of EPA's January 2011 AP-42 were used to calculate the road dust $PM_{2.5}$ and PM_{10} emissions.

Data Considered

The closest air monitoring station to the project area that monitors particulate matter is the Anaheim Station, located at 1630 West Pampas. This station monitors $PM_{2.5}$ and PM_{10} concentrations. This monitoring station is located approximately 1,700 feet upwind from I-5 approximately 9 miles northwest of the project area. The segment of I-5 closest to the monitoring station has an existing (2011) average daily traffic (ADT) volume of 256,000 and a daily truck volume of 15,900. Between I-405 and I-5, the existing ADT along SR-55 ranges from 154,000 to 287,000, with an average daily

[1] EMFAC2011 was released by ARB on September 19, 2011. However, the EPA has not yet completed its review of EMFAC2011 and made it available for conformity use.

truck volume of 8,900 to 16,600. Therefore, the air quality concentrations monitored at the Anaheim Station are representative of the conditions within the project area.

Trends in Baseline $PM_{2.5}$ Concentrations. The monitored $PM_{2.5}$ concentrations at the Anaheim station are shown in Table A. This data show that the Federal 24-hour $PM_{2.5}$ air quality standard

Table A: Ambient $PM_{2.5}$ Monitoring Data ($\mu g/m^3$)

	2006	2007	2008	2009	2010	2011
Anaheim – West Pampas Lane Air Quality Monitoring Station						
3-year average 98th percentile	42.3	41.7	38.2	36.6	30.1	29.0
Exceeds Federal 24-hour standard (35 $\mu g/m^3$)?	Yes	Yes	Yes	Yes	No	No
3-year National annual average	15.2	14.3	14.0	13.3	12.1	11.2
Exceeds Federal annual average standard (15 $\mu g/m^3$)?	Yes	No	No	No	No	No

Source: ARB Web site: http://www.arb.ca.gov/adam/, August 2012.
$\mu g/m^3$ = micrograms per cubic meter

(35 $\mu g/m^3$) has been exceeded in 4 out of the past 6 years. The annual average $PM_{2.5}$ NAAQS (15 $\mu g/m^3$) was exceeded in 2006.

Projected 24-Hour Concentrations. The levels of $PM_{2.5}$ in the project vicinity exceeded the Federal 24-hour standard between 2005 and 2009. The Federal 24-hour standard was not exceeded in 2010 or 2011. Using various methodologies, the 2007 AQMP estimated the 2015 24-hour $PM_{2.5}$ concentrations. Table V-2-16 in the 2007 AQMP estimates that the 24-hour $PM_{2.5}$ concentration in Anaheim will range from 34.6 to 42.8 $\mu g/m^3$ in 2015. However, based on the data in Table A, the concentrations measured in 2010 and 2011 range from 30.1 to 29.0 $\mu g/m^3$. Therefore, it is estimated that the 24-hour $PM_{2.5}$ level would be 30.0 $\mu g/m^3$, 14 percent below the Federal standard.

Projected Annual Concentrations. While the current levels of $PM_{2.5}$ in the project vicinity are generally above the Federal annual standard, indications are that levels in the future will continue to decrease. Table V-2-15c in the 2007 AQMP estimates that the annual PM2.5 concentration in Anaheim will be 12.3 $\mu g/m^3$ in 2014, which is approximately 18 percent below the Federal standard.

Trends in Baseline PM_{10} Concentrations. The PM_{10} concentrations monitored at the Anaheim station are shown in Table B. With the exception of 2007, the Federal 24-hour PM_{10} air quality standard (150 $\mu g/m^3$) was not exceeded between 2006 and 2011.

Table B: Ambient PM_{10} Monitoring Data (µg/m^3)

	2006	2007	2008	2009	2010	2011
Anaheim – West Pampas Lane Air Quality Monitoring Station						
First Highest	104.0	489.0	111.5	97.4	43.0	53.0
Second Highest	95.0	75.0	93.8	75.4	42.0	51.0
Third Highest	61.0	69.0	80.9	59.3	39.0	50.0
Fourth Highest	60.0	63.0	80.6	57.6	36.0	42.0
No. of days above National 24-hour standard (150 µg/m^3)	0	1	0	0	0	0

Source: ARB Web site: http://www.arb.ca.gov/adam/, August 2012.
µg/m^3 = micrograms per cubic meter

The 2007 AQMP (SCAQMD) reports that since the Federal annual PM_{10} standard has been revoked, the Basin is expected to be declared in attainment for the 24-hour Federal PM_{10} standard since 2000. Table V-3-1 in the 2007 AQMP lists the projected 24-hour PM_{10} concentrations at various stations within the Basin. It is estimated that the 24-hour concentration in Anaheim will be 68 µg/m^3 by 2015, 45 percent of the Federal standard.

Traffic Changes Due to the Proposed Project

The proposed project is a highway expansion project. Based on the Traffic Operations Report (Fehr and Peers, July 2012), the proposed project would increase the traffic volumes along SR-55. Tables C and D list the ADT and truck ADT volumes along SR-55 for the 2020 and 2040 conditions, respectively. Tables E and F list the increase in ADT and truck ADT for each build alternative for the 2020 and 2040 conditions, respectively. The largest increase in ADT due to the proposed project is 18,400 vehicles per day. The largest increase in truck ADT due to the proposed project is 1,065 ADT. Therefore, a vehicle emission analysis was prepared to determine the proposed project's effect on the region attaining the Federal $PM_{2.5}$ and PM_{10} air quality standards.

Daily Vehicle Emission Changes Due to the Proposed Project

A supplemental traffic analysis (Fehr and Peers, November 2012) calculated the daily VMT and daily vehicle hours traveled (VHT) for all of the vehicle trips within the project area. The focused study area for the VMT/VHT analysis covers the project limit (SR-55 corridor between I-5 and I-405) plus a 2-mile buffer outside of the project limit, which is generally surrounded by 17th Street to the north, State Route 73 (SR-73) to the south, Jamboree Road to the east, and Bristol Street/Flower Street/Main Street to the west. This traffic data, in conjunction with the EMFAC2007 emission model, was used to calculate the $PM_{2.5}$ and PM_{10} exhaust, tire wear, and brake wear emissions for each of the project alternatives. EMFAC2007 does not estimate road dust emissions; therefore, the emission rates listed in Section 13.2.1 of EPA's AP-42 were used to calculate the road dust $PM_{2.5}$ and PM_{10} emissions. The $PM_{2.5}$ emissions are presented in Tables G and I for the 2020 and 2040 conditions, respectively. The PM_{10} emissions are presented in Tables H and J for the 2020 and 2040 conditions, respectively. As shown, implementation of the proposed project would have a very small impact on the regional $PM_{2.5}$ and PM_{10} emissions. The project alternatives would increase the $PM_{2.5}$ emissions by 0.07 to 0.39

Table C: 2020 SR-55 Traffic Volumes

Segment	No Build		Alternative 1		Alternative 2		Alternative 3		Alternative 4	
	ADT	Truck ADT	ADT	Truck ADT	ADT	Truck ADT	ADT	Truck ADT	ADT	Truck ADT
South of I-405	173,900	10,086	174,185	10,103	174,810	10,139	174,950	10,147	174,220	10,105
Between I-405 and Main Street	253,435	14,699	254,715	14,773	257,390	14,929	258,275	14,980	254,925	14,786
Between Main Street and Dyer Road	265,645	15,407	267,105	15,492	269,670	15,641	270,755	15,704	267,750	15,530
Between Dyer Road and Edinger Avenue	279,200	16,194	281,450	16,324	283,875	16,465	285,125	16,537	282,130	16,364
Between Edinger Avenue and McFadden Avenue	291,205	16,890	293,350	17,014	295,440	17,136	296,385	17,190	293,840	17,043
Between McFadden Avenue and I-5	256,880	14,899	258,395	14,987	260,325	15,099	260,990	15,137	259,165	15,032
North of Irvine Boulevard/4th Street	223,435	12,959	223,885	12,985	224,210	13,004	224,390	13,015	224,155	13,001

Source: LSA Associates, Inc. and Fehr & Peers (July 2012).
ADT = average daily trips
I-405 = Interstate 405
I-5 = Interstate 5
SR-55 = State Route 55

Table D: 2040 SR-55 Traffic Volumes

Segment	No Build		Alternative 1		Alternative 2		Alternative 3		Alternative 4	
	ADT	Truck ADT	ADT	Truck ADT	ADT	Truck ADT	ADT	Truck ADT	ADT	Truck ADT
South of I-405	187,145	10,854	188,015	10,905	190,175	11,030	190,475	11,048	188,195	10,915
Between I-405 and Main Street	266,010	15,429	270,060	15,663	278,490	16,152	281,260	16,313	270,810	15,707
Between Main Street and Dyer Road	281,290	16,315	285,845	16,579	293,885	17,045	297,200	17,238	287,875	16,697
Between Dyer Road and Edinger Avenue	292,890	16,988	299,810	17,389	307,170	17,816	311,245	18,052	302,140	17,524
Between Edinger Avenue and McFadden Avenue	303,130	17,582	309,455	17,948	317,150	18,395	319,495	18,531	311,890	18,090
Between McFadden Avenue and I-5	280,540	16,271	285,470	16,557	291,440	16,904	292,995	16,994	288,300	16,721
North of Irvine Boulevard/4th Street	259,230	15,035	260,065	15,084	262,420	15,220	262,515	15,226	260,680	15,119

Source: LSA Associates, Inc. and Fehr & Peers (July 2012).
ADT = average daily trips
I-405 = Interstate 405
I-5 = Interstate 5
SR-55 = State Route 55

Table E: 2020 Change in SR-55 Traffic Volumes

Segment	Alternative 1 – No Build		Alternative 2 – No Build		Alternative 3 – No Build		Alternative 4 – No Build	
	ADT	Truck ADT	ADT	Truck ADT	ADT	Truck ADT	ADT	Truck ADT
South of I-405	285	17	910	53	1,050	61	320	19
Between I-405 and Main Street	1,280	74	3,955	229	4,840	281	1,490	86
Between Main Street and Dyer Road	1,460	85	4,025	233	5,110	296	2,105	122
Between Dyer Road and Edinger Avenue	2,250	131	4,675	271	5,925	344	2,930	170
Between Edinger Avenue and McFadden Avenue	2,145	124	4,235	246	5,180	300	2,635	153
Between McFadden Avenue and I-5	1,515	88	3,445	200	4,110	238	2,285	133
North of Irvine Boulevard/4th Street	450	26	775	45	955	55	720	42

Source: LSA Associates, Inc. and Fehr & Peers (July 2012).
ADT = average daily trips
I-405 = Interstate 405
I-5 = Interstate 5
SR-55 = State Route 55

Table F: Change in 2040 SR-55 Traffic Volumes

Segment	Alternative 1 – No Build		Alternative 2 – No Build		Alternative 3 – No Build		Alternative 4 – No Build	
	ADT	Truck ADT	ADT	Truck ADT	ADT	Truck ADT	ADT	Truck ADT
South of I-405	870	50	3,030	176	3,330	193	1,050	61
Between I-405 and Main Street	4,050	235	12,480	724	15,250	885	4,800	278
Between Main Street and Dyer Road	4,555	264	12,595	731	15,910	923	6,585	382
Between Dyer Road and Edinger Avenue	6,920	401	14,280	828	18,355	1,065	9,250	537
Between Edinger Avenue and McFadden Avenue	6,325	367	14,020	813	16,365	949	8,760	508
Between McFadden Avenue and I-5	4,930	286	10,900	632	12,455	722	7,760	450
North of Irvine Boulevard/4th Street	835	48	3,190	185	3,285	191	1,450	84

Source: LSA Associates, Inc. and Fehr & Peers (July 2012).
ADT = average daily trips
I-405 = Interstate 405
I-5 = Interstate 5
SR-55 = State Route 55

Table G: 2020 $PM_{2.5}$ Emissions (lbs/day)

Source	2020				
	No Build	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Exhaust	445.6	445.6	447.1	447.5	446.4
Reentrained	617.5	618.2	619.3	619.7	618.6
Total	1,063.1	1,063.8	1,066.4	1,067.2	1,065.0
% Change	-	0.07	0.31	0.39	0.18

Source: LSA Associates, Inc., November 2012.
lbs/day = pounds per day
$PM_{2.5}$ = particulate matte less than 2.5 microns in diameter

Table H: 2020 PM_{10} Emissions (lbs/day)

Source	2020				
	No Build	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Exhaust	739.6	740.1	742.1	742.8	741.0
Reentrained	2,470.1	2,472.8	2,477.0	2,478.8	2,474.3
Total	3,209.7	3,212.9	3,219.2	3,221.6	3,215.3
% Change	-	0.10	0.29	0.37	0.17

Source: LSA Associates, Inc., November 2012.
lbs/day = pounds per day
PM_{10} = particulate matter less than 10 microns in diameter

Table I: 2040 $PM_{2.5}$ Emissions (lbs/day)

Source	2040				
	No Build	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Exhaust	496.7	497.7	501.1	501.6	499.1
Reentrained	683.0	684.5	687.0	688.1	685.4
Total	1,179.7	1,182.2	1,188.0	1,189.7	1,184.5
% Change	-	0.21	0.71	0.85	0.41

Source: LSA Associates, Inc., November 2012.
lbs/day = pounds per day
$PM_{2.5}$ = particulate matte less than 2.5 microns in diameter

Table J: 2040 PM_{10} Emissions (lbs/day)

Source	2040				
	No Build	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Exhaust	829.0	830.2	834.9	836.6	832.4
Reentrained	2,731.8	2,737.9	2,747.9	2,752.4	2,741.5
Total	3,560.9	3,568.1	3,582.7	3,589.0	3,573.9
% Change	-	0.20	0.61	0.79	0.37

Source: LSA Associates, Inc., November 2012.
lbs/day = pounds per day
PM_{10} = particulate matter less than 10 microns in diameter

percent (0.8 to 4.1 pounds per day [lbs/day]) in 2020 and by 0.21 to 0.85 percent (2.4 to 10.0 lbs/day) in 2040 when compared to the No Build conditions. The project alternatives would increase the PM_{10} emissions by 0.10 to 0.37 percent (3.2 to 11.9 lbs/day) in 2020 and by 0.20 to 0.79 percent (7.2 to 28.1 lbs/day) in 2040 when compared to the No Build conditions. The results of the modeling are included in Appendix PM-A.

CONCLUSION

Transportation conformity is required under Section 176(c) of the CAA to ensure that Federally supported highway and transit project activities are consistent with the purpose of the SIP. Conformity for the purpose of the SIP means that transportation activities will not cause new air quality violations, worsen existing violations, or delay timely attainment of the relevant NAAQS. As required by the 2006 Final Rule, this qualitative $PM_{2.5}$ and PM_{10} hot-spot analysis demonstrates that this project meets the CAA conformity requirements to support State and local air quality goals with respect to potential localized air quality impacts.

It is not expected that changes to $PM_{2.5}$ and PM_{10} emissions levels associated with the proposed project would result in new violations of the Federal air quality standards for the following reasons:

- Based on the projected $PM_{2.5}$ concentrations listed in the 2007 AQMP, without the proposed project, the 24-hour $PM_{2.5}$ concentrations within the project area would be reduced to 14 percent below the Federal standard by 2015.
- Based on the projected $PM_{2.5}$ concentrations listed in the 2007 AQMP, without the proposed project, the annual average $PM_{2.5}$ concentrations within the project area would be reduced to 18 percent below the Federal standard by 2014.
- With the exception of 2007, the ambient PM_{10} concentrations have not exceeded the 24-hour or annual Federal standard.
- Based on the projected PM_{10} concentrations listed in the 2007 AQMP, without the proposed project, the 24-hour PM_{10} concentrations would be 55 percent below the Federal standard by 2015.
- When compared to the No Build conditions, the largest increase in regional $PM_{2.5}$ and PM_{10} emissions is 0.85 percent.

For these reasons, future new or worsened $PM_{2.5}$ and PM_{10} violations of any standards are not anticipated; therefore, the project meets the conformity hot-spot requirements in 40 CFR 93-116 and 93-123 for both $PM_{2.5}$ and PM_{10}.

REFERENCES

South Coast Air Quality Management District, Air Quality Management Plan, 2007.

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———. 2006b. Final Revisions to the National Ambient Air Quality Standards for Particulate Pollution (Particulate Matter). EPA website: www.epa.gov/oar/particulatepollution/naaqsrev2006.html, accessed on March 19, 2007.

APPENDIX PM-A

$PM_{2.5}$ AND PM_{10} EMISSIONS METHODOLOGY

SR-55 (5 to 405) PR/ED - Project Area VMT by Speed Bin

	Existing	Year 2040					Year 2020				
	2011	Base	Alt 1	Alt 2	Alt 3	Alt 5	Base	Alt 1	Alt 2	Alt 3	Alt 5
VMT Total	7,783,000	9,038,000	9,058,000	9,091,000	9,106,000	9,070,000	8,172,000	8,181,000	8,195,000	8,201,000	8,186,000

VMT by Speed Bin											
	Existing	Year 2040					Year 2020				
Speed Bin	2011	Base	Alt 1	Alt 2	Alt 3	Alt 5	Base	Alt 1	Alt 2	Alt 3	Alt 5
0-5 mph	20,373	13,453	13,495	21,698	19,431	21,689	16,778	16,801	20,505	19,483	20,501
5-10 mph	37,889	63,027	73,959	62,514	62,763	62,111	48,386	53,313	48,124	48,225	47,954
10-15 mph	53,723	99,171	95,948	99,141	101,702	134,054	73,039	71,565	72,969	74,101	88,747
15-20 mph	119,390	311,428	290,073	305,657	287,780	233,257	203,472	193,741	200,621	192,490	168,047
20-25 mph	309,215	902,396	869,702	866,764	925,205	916,505	570,300	555,262	553,460	579,538	576,202
25-30 mph	979,569	1,744,793	1,852,661	1,836,409	1,713,647	1,778,864	1,303,070	1,351,473	1,343,419	1,287,757	1,317,889
30-35 mph	1,980,137	2,276,332	1,949,650	1,961,288	2,079,306	2,083,788	2,068,663	1,921,140	1,926,471	1,979,569	1,981,680
35-40 mph	1,128,941	938,725	1,152,957	1,177,572	1,189,331	1,039,235	1,017,073	1,114,000	1,125,107	1,130,351	1,062,672
40-45 mph	920,948	847,923	1,007,477	775,185	756,713	941,323	866,828	938,988	834,242	825,958	909,106
45-50 mph	816,540	970,702	729,527	522,648	620,057	923,502	867,521	758,595	665,450	709,413	846,157
50-55 mph	575,984	360,202	511,135	920,538	551,673	380,018	465,230	533,542	718,143	551,882	474,394
55-60 mph	569,950	413,018	414,726	447,677	704,014	454,646	485,940	486,834	501,838	617,303	504,898
60-65 mph	242,797	75,352	75,313	73,044	73,355	78,690	161,532	161,618	160,747	160,951	163,195
65-70 mph	27,544	21,477	21,375	20,866	21,024	22,318	24,170	24,129	23,905	23,979	24,556
70-75 mph	0	0	0	0	0	0	0	0	0	0	0
75-80 mph	0	0	0	0	0	0	0	0	0	0	0
Total	**7,783,000**	**9,038,000**	**9,058,000**	**9,091,000**	**9,106,000**	**9,070,000**	**8,172,000**	**8,181,000**	**8,195,000**	**8,201,000**	**8,186,000**

2020 EMFAC Emissions Rates

Speed MPH	PM10 Exhaust	PM10 Tire	PM10 Brake	PM10 Total	PM2.5 Exhaust	PM2.5 Tire	PM2.5 Brake	PM2.5 Total
0	0.023	0	0	0.023	0.021	0	0	0.021
5	0.096	0.009	0.013	0.118	0.089	0.002	0.005	0.096
10	0.064	0.009	0.013	0.086	0.059	0.002	0.005	0.066
15	0.044	0.009	0.013	0.066	0.041	0.002	0.005	0.048
20	0.033	0.009	0.013	0.055	0.03	0.002	0.005	0.037
25	0.025	0.009	0.013	0.047	0.024	0.002	0.005	0.031
30	0.021	0.009	0.013	0.043	0.019	0.002	0.005	0.026
35	0.018	0.009	0.013	0.04	0.017	0.002	0.005	0.024
40	0.016	0.009	0.013	0.038	0.015	0.002	0.005	0.022
45	0.015	0.009	0.013	0.037	0.014	0.002	0.005	0.021
50	0.015	0.009	0.013	0.037	0.014	0.002	0.005	0.021
55	0.016	0.009	0.013	0.038	0.015	0.002	0.005	0.022
60	0.018	0.009	0.013	0.04	0.016	0.002	0.005	0.023
65	0.02	0.009	0.013	0.042	0.019	0.002	0.005	0.026
70	0.021	0.009	0.013	0.043	0.02	0.002	0.005	0.027
75	0.022	0.009	0.013	0.044	0.02	0.002	0.005	0.027
80	0.023	0.009	0.013	0.045	0.021	0.002	0.005	0.028

Road Dust	0.000302	7.55652E-05

2040 EMFAC Emissions Rates

Speed MPH	PM10 Exhaust	PM10 Tire	PM10 Brake	PM10 Total	PM2.5 Exhaust	PM2.5 Tire	PM2.5 Brake	PM2.5 Total
0	0.019	0	0	0.019	0.017	0	0	0.017
5	0.096	0.009	0.013	0.118	0.089	0.002	0.005	0.096
10	0.063	0.009	0.013	0.085	0.059	0.002	0.005	0.066
15	0.044	0.009	0.013	0.066	0.041	0.002	0.005	0.048
20	0.032	0.009	0.013	0.054	0.03	0.002	0.005	0.037
25	0.025	0.009	0.013	0.047	0.023	0.002	0.005	0.03
30	0.021	0.009	0.013	0.043	0.019	0.002	0.005	0.026
35	0.018	0.009	0.013	0.04	0.016	0.002	0.005	0.023
40	0.016	0.009	0.013	0.038	0.015	0.002	0.005	0.022
45	0.015	0.009	0.013	0.037	0.014	0.002	0.005	0.021
50	0.015	0.009	0.013	0.037	0.014	0.002	0.005	0.021
55	0.016	0.009	0.013	0.038	0.015	0.002	0.005	0.022
60	0.018	0.009	0.013	0.04	0.016	0.002	0.005	0.023
65	0.02	0.009	0.013	0.042	0.019	0.002	0.005	0.026
70	0.021	0.009	0.013	0.043	0.019	0.002	0.005	0.026
75	0.021	0.009	0.013	0.043	0.02	0.002	0.005	0.027
80	0.022	0.009	0.013	0.044	0.02	0.002	0.005	0.027

Road Dust	0.000302	7.55652E-05

2020 Emissons

PM10 (lb/day)

Speed Bin	No Build	Alt 1	Alt 2	Alt 3	Alt 5
0-5 mph	4.4	4.4	5.3	5.1	5.3
5-10 mph	9.2	10.1	9.1	9.1	9.1
10-15 mph	10.6	10.4	10.6	10.8	12.9
15-20 mph	24.7	23.5	24.3	23.3	20.4
20-25 mph	59.1	57.5	57.3	60.0	59.7
25-30 mph	123.5	128.1	127.4	122.1	124.9
30-35 mph	182.4	169.4	169.9	174.6	174.8
35-40 mph	85.2	93.3	94.3	94.7	89.0
40-45 mph	70.7	76.6	68.0	67.4	74.2
45-50 mph	70.8	61.9	54.3	57.9	69.0
50-55 mph	39.0	44.7	60.2	46.2	39.7
55-60 mph	42.9	42.9	44.3	54.4	44.5
60-65 mph	15.0	15.0	14.9	14.9	15.1
65-70 mph	2.3	2.3	2.3	2.3	2.3
70-75 mph	0.0	0.0	0.0	0.0	0.0
75-80 mph	0.0	0.0	0.0	0.0	0.0
	739.6	740.1	742.1	742.8	741.0
Road Dust	2470.1	2472.8	2477.0	2478.8	2474.3
total	3209.7	3212.9	3219.2	3221.6	3215.3
Change from No Build		3.2	9.5	11.9	5.6
		0.10	0.29	0.37	0.17

PM2.5 (lb/day)

Speed Bin	No Build	Alt 1	Alt 2	Alt 3	Alt 5
0-5 mph	3.6	3.6	4.3	4.1	4.3
5-10 mph	7.0	7.8	7.0	7.0	7.0
10-15 mph	7.7	7.6	7.7	7.8	9.4
15-20 mph	16.6	15.8	16.4	15.7	13.7
20-25 mph	39.0	37.9	37.8	39.6	39.4
25-30 mph	74.7	77.5	77.0	73.8	75.5
30-35 mph	109.5	101.6	101.9	104.7	104.9
35-40 mph	49.3	54.0	54.6	54.8	51.5
40-45 mph	40.1	43.5	38.6	38.2	42.1
45-50 mph	40.2	35.1	30.8	32.8	39.2
50-55 mph	22.6	25.9	34.8	26.8	23.0
55-60 mph	24.6	24.7	25.4	31.3	25.6
60-65 mph	9.3	9.3	9.2	9.2	9.4
65-70 mph	1.4	1.4	1.4	1.4	1.5
70-75 mph	0.0	0.0	0.0	0.0	0.0
75-80 mph	0.0	0.0	0.0	0.0	0.0
	445.6	445.6	447.1	447.5	446.4
Road Dust	617.5	618.2	619.3	619.7	618.6
total	1063.1	1063.8	1066.4	1067.2	1065.0
Change from No Build		0.8	3.3	4.1	1.9
		0.07	0.31	0.39	0.18

2040 Emissons

PM10 (lb/day)

Speed Bin	No Build	Alt 1	Alt 2	Alt 3	Alt 5
0-5 mph	3.5	3.5	5.6	5.1	5.6
5-10 mph	11.8	13.9	11.7	11.8	11.6
10-15 mph	14.4	14.0	14.4	14.8	19.5
15-20 mph	37.1	34.5	36.4	34.3	27.8
20-25 mph	93.5	90.1	89.8	95.9	95.0
25-30 mph	165.4	175.6	174.1	162.4	168.6
30-35 mph	200.7	171.9	173.0	183.4	183.8
35-40 mph	78.6	96.6	98.7	99.6	87.1
40-45 mph	69.2	82.2	63.2	61.7	76.8
45-50 mph	79.2	59.5	42.6	50.6	75.3
50-55 mph	30.2	42.8	77.1	46.2	31.8
55-60 mph	36.4	36.6	39.5	62.1	40.1
60-65 mph	7.0	7.0	6.8	6.8	7.3
65-70 mph	2.0	2.0	2.0	2.0	2.1
70-75 mph	0.0	0.0	0.0	0.0	0.0
75-80 mph	0.0	0.0	0.0	0.0	0.0
	829.0	830.2	834.9	836.6	832.4
Road Dust	2731.8	2737.9	2747.9	2752.4	2741.5
total	3560.9	3568.1	3582.7	3589.0	3573.9
Change from No Build		7.2	21.8	28.1	13.0
		0.20	0.61	0.79	0.37

PM2.5 (lb/day)

Speed Bin	No Build	Alt 1	Alt 2	Alt 3	Alt 5
0-5 mph	2.8	2.9	4.6	4.1	4.6
5-10 mph	9.2	10.8	9.1	9.1	9.0
10-15 mph	10.5	10.2	10.5	10.8	14.2
15-20 mph	25.4	23.7	24.9	23.5	19.0
20-25 mph	59.7	57.5	57.3	61.2	60.6
25-30 mph	100.0	106.2	105.3	98.2	102.0
30-35 mph	115.4	98.9	99.4	105.4	105.7
35-40 mph	45.5	55.9	57.1	57.7	50.4
40-45 mph	39.3	46.6	35.9	35.0	43.6
45-50 mph	44.9	33.8	24.2	28.7	42.8
50-55 mph	17.5	24.8	44.6	26.8	18.4
55-60 mph	20.9	21.0	22.7	35.7	23.1
60-65 mph	4.3	4.3	4.2	4.2	4.5
65-70 mph	1.2	1.2	1.2	1.2	1.3
70-75 mph	0.0	0.0	0.0	0.0	0.0
75-80 mph	0.0	0.0	0.0	0.0	0.0
	496.7	497.7	501.1	501.6	499.1
Road Dust	683.0	684.5	687.0	688.1	685.4
total	1179.7	1182.2	1188.0	1189.7	1184.5
Change from No Build		2.5	8.4	10.0	4.8
		0.21	0.71	0.85	0.41

Reentrained Road Dust

E=k(sL)^0.91x(w)^1.02		AP-42 Section 13.2.1.3 (January 2011)
sL =	0.037	Orange County
w =	2.7	tons (Orange County)
k =	0.25	PM2.5 for g/VMT
k =	1	PM10 for g/VMT

PM10

E= 0.137105415 g/mile

PM2.5

E= 3.427635E-02 g/mile